

ABSTRACT

A method for joining similar materials to create multi-component assemblies so the joint materials share similar physical, chemical, and electrical characteristics with the base materials. The method includes aligning the materials, applying joining material, focusing a microwave beam on the joint area to initially heat the joint area to allow the joining material to soften and fill physical discontinuities while the surrounding surfaces remains cool, rapidly heating the joint area to the reactive area of the joining material, rapidly cooling the joint area and maintaining the joint area at a recrystallization temperature. The materials can be ceramics such as aluminum oxide.